



Automatic Payload Deployment System (APDS)



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Who we are

- ▼ **SPAWAR** is the Navy's Information Dominance Systems Command
 - Navy's IT Technical Authority and acquisition command for C4ISR,* business IT, and space systems
 - Provide advanced communications and information capabilities to Navy, joint and coalition forces
- ▼ **SSC Pacific** enables information dominance for our Naval, Joint, National and Coalition warfighters through research, development, delivery, and support of integrated capabilities.

*Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance

- ▼ **Opportunity**
 - Seeking licensees
 - Seeking collaborators



Limitations in Unmanned Ground Vehicles (UGVs) and Sensor Deployment



- ▼ Over 7,500 UGVs exist for search, reconnaissance, bomb disposal, and other dangerous missions.

- ▼ Sensors for reconnaissance and detection are usually hand-carried or hand-placed by personnel in hostile environments or “hot” zones.



The Automatic Payload Deployment System (APDS)



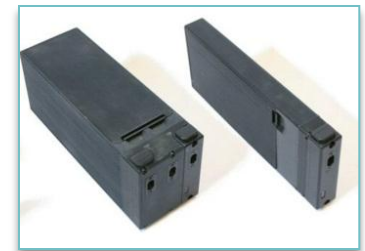
- ▼ Mounts on a mobile platform
- ▼ Automatically deploys radio relays to extend communications
- ▼ Deployer, relays, and controller form a mesh network
- ▼ Other payloads can be developed for reconnaissance, detection, and other applications



■ Camera Node



■ IR Illumination Node



■ Payload Carrier

▼ Size

- Current prototype is 11"x16"x3.5"
- Size is driven by radio hardware, antenna, and battery on relay
 - Newer, smaller routers could be used to create a smaller version
- Not limited to 2x3 payload configuration

▼ Frequency

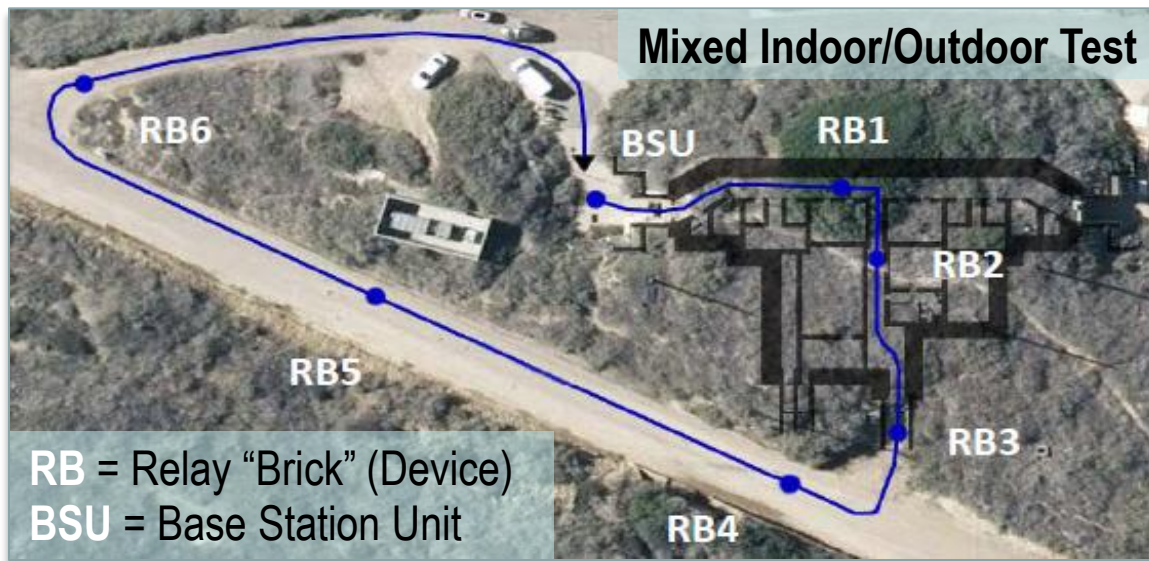
- Operates at 2.4 GHz 802.11g
- MiniPCI card could be swapped out to operate at other frequencies

▼ Power

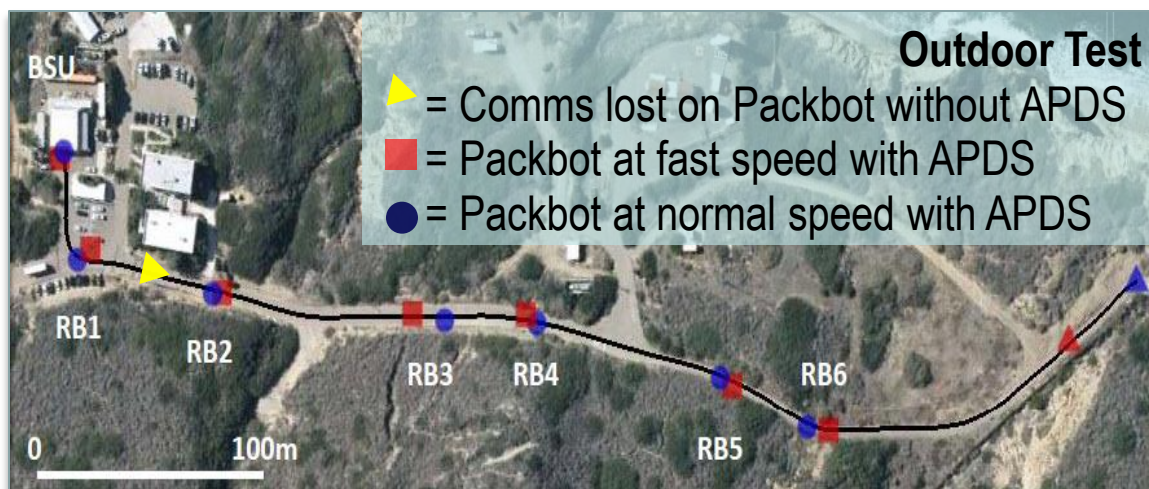
- Uses rechargeable Lithium-ion batteries
- One prototype radio relay draws ~10W
- Deployer can be externally powered by UGV while battery is charging



Test Results



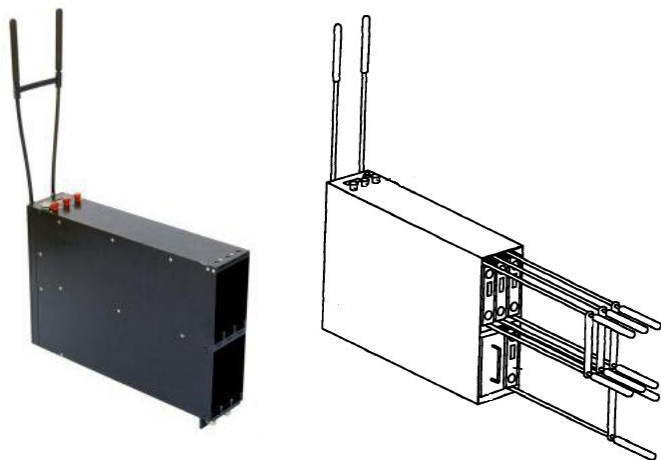
- ▼ Indoor bunker of 12-foot thick steel reinforced walls that highly attenuate radio signals
- ▼ Outdoor route with curves and dips



- ▼ Outdoor route with curves, hills, and dips
- ▼ Results for both tests:
 - Continuous UGV control
 - Reliable link
 - Low latency (200ms)

Intellectual Property

▼ U.S. Patent 8103212: Relay device deployer system



▼ U.S. Patent 8219023: Remotely operated illumination device (ROID)



▼ U.S. Patent Application 12/503170: Next generation automatically-deployed communication relay



Technology Landscape

- ▼ No current product combines extended comms w/ payload deployment
- ▼ Current radios and sensors are mounted on robots, not deployed
- ▼ Below are technologies in extended comms:

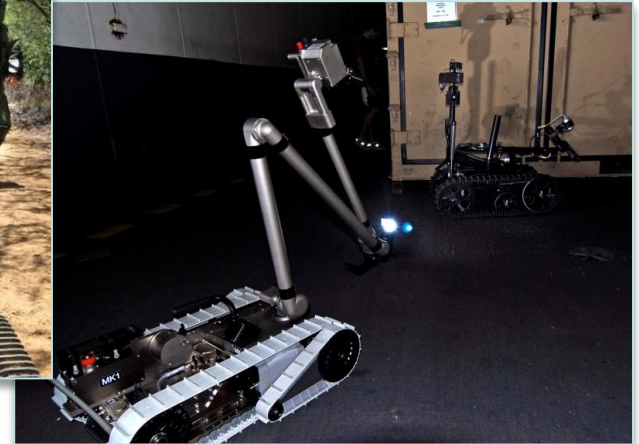
Product	UGV platform tested	How product extends comms
SC3500 MIMO Radio ¹	QinetiQ Talon and iRobot Fastac	Network formed with radios added to robots and controllers
AWE (Assured Wireless Ethernet) Mesh Router ²	iRobot Bombot	Shifts native RF (e.g., uses low RF for longer distances)

1. Silvus Technologies 2. Nomadio

Applications and Possibilities

▼ Applications include:

- Ad hoc telecommunication networks
- Sensor networks
- Supply deployment
- Search
- Reconnaissance
- Hazardous spill investigation
- Explosive ordnance disposal



▼ Other possibilities:

- Consumer Electronics?
- Toys?
- Power/Oil Industry?
- Space industry?
- RF operated "Lightstick"?



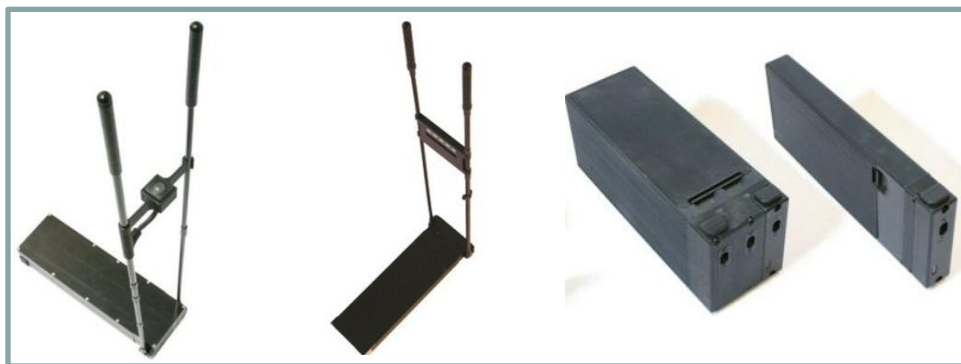
Development Status/Opportunity

▼ Development Status

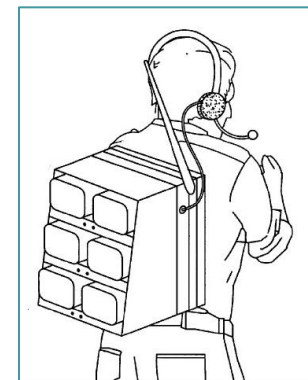
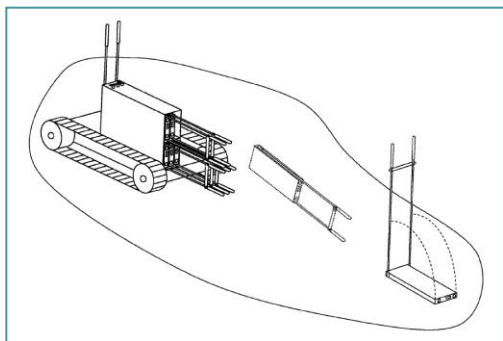
- \$1.5M invested over 8 years
- Intellectual property exists
- System prototype tested
- Test data results available

▼ Seeking

- Licensing partners to commercialize APDS
- Collaborators to further APDS



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